التجربة الثالثة

اسم التجربة:- الحرارة الكامنة لانصهار الجليد

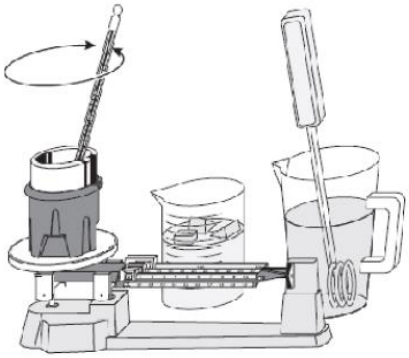
The latent heat of fusion of ice

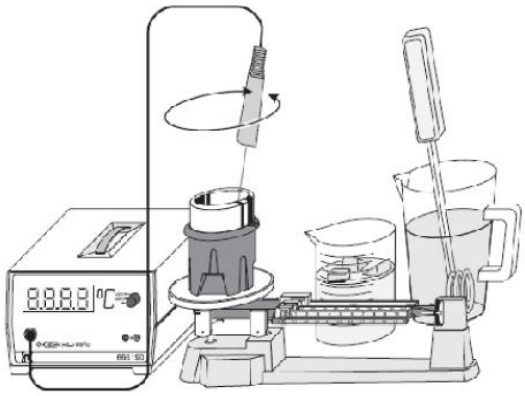
The purpose of the experiment:-

Find the latent heat of fusion of ice

Used equipment's :-

Calorimeter, thermometer, beaker, graduated tester, stop watch, heater, scales , a little bit of ice.





Theory :-

The latent heat of fusion is defined as the amount of heat energy required to convert one gram of a solid at the melting point into a liquid at the same temperature. As providing the solid body with heat while it is at its melting point changes the state of the body instead of raising its temperature.

If we imagine that we have a block of ice whose temperature is below zero degrees Celsius (0 ^{o}C) and a heater and a thermometer are placed in the block, after the passage of the current and the supply of energy, the temperature will rise to zero. After the reading of the thermometer

is confirmed, the ice begins to transform, and the thermometer reading remains constant until the completion of the transformation of all the ice. The reading of the thermometer begins to rise until the water begins to boil for a long period. And until all the water turns into steam, after that the temperature begins to rise again.

The energy that is equipped to convert ice into water is called the latent heat of fusion, and it is a hidden energy because it did not appear in the thermometer reading, as the reading did not change during the conversion.

Work steps :-

1- Clean and dry the calorimeter, then determine its weight while it is empty and let it be (m_o) and record the ambient temperature (t_o ^oC).
2- Heat a little water in a beaker to a temperature of about (40°C). Then fill half of the calorimeter with this water, then weigh the calorimeter with what is in it, and let it be (m_1 gm).
3- Prepare small pieces of ice, then measure accurately the temperature of the water in the calorimeter, and let it be (t_1 C^o) it must be about (10) degrees higher than the ambient temperature, then start throwing the pieces of ice into it gradually after drying each piece with blotting paper. Stir the water constantly until all of the pieces are melted.
4- Continue adding more pieces and stirring the contents of the calorimeter until the temperature drops to a degree lower than the ambient temperature by an amount equal to or approximately (t_1-t_o) at which point stop adding the pieces of ice and continue stirring the water. Record the lowest temperature reached by water (t_2 C^o).
5- Weigh the calorimeter with its contents to find out the mass of ice added, let it be (m gm).

6- The latent heat of fusion of ice is calculated through the energy balancing equation, where the energy lost by the calorimeter and the water gained by the ice is as follows:

$$m\,L + mc_w(t_2 - 0) = [m_w c_w + m_o c_o](\Delta t)$$

$m_w \equiv$ water mass

$$m\,L + mc_w t_2 = [(m_1 - m_o)c_w + m_o c_o](t_1 - t_2)$$

$$L = \frac{[(m_1 - m_o)c_w + m_o c_o](t_1 - t_2) - mc_w t_2}{m}$$

حيث أن :-

C_o =	It represents the specific heat of the calorimeter
C_w =	It represents the specific heat of water
m_o =	The mass of the calorimeter is empty
m_1 =	The mass of calorimeter and water
m =	The mass of ice
t_1 =	hot water temperature
t_2 =	Cold water temperature after ice has been applied